

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

1. (CURRENTLY AMENDED) A solid-state image pickup apparatus comprising:

an image pickup section including:

a color separating section including color filters assigned to three primary colors R (red), G (green) and B (blue) for separating colors of light incident from a desired scene, the color filters assigned to the color G being arranged in vertical stripes, ~~the color filters assigned to the colors R and B being arranged diagonally with respect to the color filters assigned to the color G;~~

a plurality of photosensitive cells arranged bidimensionally in one-to-one correspondence to said color filters each for transforming light output from a particular color filter to a corresponding signal charge, ~~each of said plurality of photosensitive cells being shifted in position by half a pitch from adjoining ones of said photosensitive cells;~~

a plurality of vertical transfer paths, each one offset from each vertical column of said plurality of photosensitive cells, each comprising transfer elements arranged in a vertical direction for vertically transferring signal charges fed from adjoining ones of said plurality of photosensitive cells;

a horizontal transfer path perpendicular to said plurality of vertical transfer paths and comprising transfer elements arranged in a horizontal direction for transferring the signal charges fed from said plurality of vertical transfer paths;

a plurality of signal reading circuits, one for each one of said plurality of photosensitive cells, for shifting the signal charges from said plurality of photosensitive cells to said plurality of vertical transfer paths, offset from said plurality of photosensitive cells; and

charge sweeping circuitry for sweeping out needless ones of the signal charges stored in said plurality of photosensitive cells;
a mode selecting section for selecting, when an operation for reading the signal charges out of said image pickup section is represented by a mode, either one of an all pixel read mode for reading the signal charges from all of said plurality of photosensitive cells and a particular pixel read mode for reading only the signal charges representative of the color G;
a drive signal generating section for feeding horizontal and vertical drive signals to said image pickup section, and providing said horizontal drive signals with a period shorter in said particular pixel read mode than in said all pixel read mode; and
a controller for controlling said drive signal generating section in a particular manner in each of said all pixel read mode and said particular pixel read mode;
~~said mode selecting section generating a different phase of the horizontal drive signal selected from a plurality of signal levels in response to a horizontal timing signal fed from said drive signal generating section and a control signal fed from said controller.~~

2. (CURRENTLY AMENDED) An apparatus in accordance with claim 1, wherein said color separating section has any one of
a G stripe pattern,
a G stripe, RB checker pattern, and
a G stripe, RB full checker pattern in which the color G is arranged in a square lattice while the colors R and B each are diagonally arranged at opposite sides of the color G.

3. (CANCELED)

4. (PREVIOUSLY PRESENTED) An apparatus in accordance with claim 8, wherein said second horizontal drive signals have a period which is substantially equal to one half of a period of said first horizontal drive signals.

5. (PREVIOUSLY PRESENTED) A signal reading method for a solid-state image pickup apparatus including an image pickup section including a color separating section having color filters assigned to three primary colors R, G and B for separating colors of light incident from a desired scene, ~~the color filters assigned to the color G being arranged in vertical stripes, the color filters assigned to the colors R and B being arranged diagonally with respect to the color filters assigned to the color G,~~ a plurality of photosensitive cells arranged bidimensionally in one-to-one correspondence to said color filters each for transforming light output from a particular color filter to a corresponding signal charge, ~~each of the plurality of photosensitive cells being shifted in position by half a pitch from adjoining ones of the photosensitive cells,~~ and charge sweeping circuitry for sweeping out needless ones of signal charges stored in said plurality of photosensitive cells, said image pickup section transferring the signal charges of said plurality of photosensitive cells in a vertical direction, offset from vertical columns of said plurality of photosensitive cells, and then in a horizontal direction; said signal reading method comprising the steps of:

(a) selecting, when an operation for reading the signal charges out of said image pickup section is represented by a mode, either one of an all pixel read mode for reading the signal charges from all of said plurality of photosensitive cells and a particular pixel read mode for reading only the signal charges representative of the color G;

(b) generating drive signals for driving said image pickup section in accordance with said all pixel read mode or said particular pixel read mode selected thereby generating a different phase of a horizontal drive signal being generated in response to a control signal fed for said all pixel read mode or said particular pixel read mode selected;

(c) storing, in said particular pixel read mode, the signal charges derived from the color G in response to said drive signals while sweeping out the signal charges derived from the colors R and B;

(d) effecting a field shift of only the signal charges stored;

(e) vertically transferring, ~~in a path offset from said vertical column of said plurality of photosensitive cells,~~ the signal charges derived from the color G and subjected to the field shift; and

(f) horizontally transferring the signal charges vertically transferred at a period shorter than a period of time necessary for the signal charges to be read out in said all pixel read mode.

6. (ORIGINAL) A method in accordance with claim 5, wherein step (b) comprises:

(g) generating first drive signals for storing, in said particular pixel read mode, the signal charges derived from the color G while sweeping out the signal charges derived from the colors R and B;

(h) generating second drive signals for effecting the field shift;

(i) generating third drive signals for vertically transferring the signal charges subjected to the field shift; and

(j) generating drive signals for horizontally transferring the signal charges vertically transferred at a period shorter than a period of time necessary for the signal charges to be read out in said all pixel read mode.

7. (CANCELED)

8. (PREVIOUSLY PRESENTED) A solid-state image pickup apparatus comprising:

an image pickup section including:

a color separating section including color filters assigned to three primary colors R (red), G (green) and B (blue) for separating colors of light incident from a desired scene, the color filters assigned to the color G being arranged in stripes;

a plurality of photosensitive cells arranged bidimensionally in one-to-one correspondence to said color filters each for transforming light output from a particular color filter to a corresponding signal charge;

a plurality of vertical transfer paths each comprising transfer elements arranged in a vertical direction for vertically transferring signal charges fed from adjoining ones of said plurality of photosensitive cells;

a horizontal transfer path perpendicular to said plurality of vertical transfer paths and comprising transfer elements arranged in a horizontal direction for transferring the signal charges fed from said plurality of vertical transfer paths;

signal reading circuitry for shifting the signal charges from said plurality of photosensitive cells to said plurality of vertical transfer paths; and

charge sweeping circuitry for sweeping out needless ones of the signal charges stored in said plurality of photosensitive cells;

a mode selecting section for selecting, when an operation for reading the signal charges out of said image pickup section is represented by a mode, either one of an all pixel read mode for reading the signal charges from all of said plurality of photosensitive cells and a particular pixel read mode for reading only the signal charges representative of the color G;

a drive signal generating section for feeding horizontal and vertical drive signals to said image pickup section, and providing said horizontal drive signals with a period shorter in said particular pixel read mode than in said all pixel read mode; and

a controller for controlling said drive signal generating section in a particular manner in each of said all pixel read mode and said particular pixel read mode,

said mode selecting section generating a different phase of the horizontal drive signal selected from a plurality of signal levels in response to a horizontal timing signal fed from said drive signal generating section and a control signal fed from said controller;

each of said horizontal drive signals output from said drive signal generating section comprising:

first horizontal drive signals different in phase from each other and used as one unit in said all pixel read mode and equal in number to electrodes to which said drive signals are fed in said all pixel read mode; and

second horizontal drive signals different in phase from each other and used as one unit in said particular pixel read mode and two times greater in number than the electrodes used in said all pixel read mode.

9. (PREVIOUSLY PRESENTED) The solid-state image pickup apparatus of claim 8, wherein each of the plurality of the vertical transfer paths is offset from each vertical column of said plurality of photosensitive cells.

10. (NEW) The apparatus in accordance with claim 1, wherein the color filters assigned to the colors R and B being arranged diagonally with respect to the color filters assigned to the color G.

11. (NEW) The apparatus in accordance with claim 10, wherein each of said plurality of photosensitive cells being shifted in position by half a pitch from adjoining ones of said photosensitive cells.

12. (NEW) The apparatus in accordance with claim 1, wherein said mode selecting section generating a different phase of the horizontal drive signal selected from a plurality of signal levels in response to a horizontal timing signal fed from said drive signal generating section and a control signal fed from said controller.

13. (NEW) The apparatus in accordance with claim 1, wherein said drive signal generating section includes a horizontal signal driver, wherein the horizontal signal driver includes:

a first plurality of horizontal line drivers configured to output a first set of horizontal output signals based on a horizontal timing signal; and

a second plurality of horizontal line drivers configured to output a second set of horizontal output signals based on an inverted horizontal timing signal,

wherein said horizontal signal driver is configured to output said horizontal drive signals based on said first and second set of horizontal output signals.

14. (NEW) The apparatus in accordance with claim 13, wherein
a voltage of each said first set of horizontal output signals is one of a first high voltage and a first low voltage,
a voltage of each said second set of horizontal output signals is one of a second high voltage and a second low voltage, and
an order of voltages from highest to lowest is first high voltage, second high voltage, first low voltage, and second low voltage.

15. (NEW) The apparatus in accordance with claim 13, wherein said horizontal signal driver is configured to output said horizontal drive signals based on all of said first and second set of horizontal output signals in all pixel read mode, and
a subset of said first set of horizontal output signals and a subset of said second set of horizontal output signals in particular pixel read mode.

16. (NEW) The method in accordance with claim 5, wherein the color filters are assigned to the color G being arranged in vertical stripes, the color filters assigned to the colors R and B are arranged diagonally with respect to the color filters assigned to the color G, and each of the plurality of photosensitive cells are shifted in position by half a pitch from adjoining ones of the photosensitive cells, wherein in the step (e), the signal charges derived from the color G are vertically transferred in a path offset from said vertical column of said plurality of photosensitive cells.

17. (NEW) The method in accordance with claim 6, wherein said step (j) comprises:
(k) generating a first set of horizontal output signals based on a horizontal timing signal;
(l) generating a second set of horizontal output signals based on an inverted horizontal timing signal; and

(m) outputting said drive signals for horizontally transferring the signal charges based on said first and second set of horizontal output signals.

18. (NEW) The method in accordance with claim 17, wherein
a voltage of each said first set of horizontal output signals is one of a first high voltage and a first low voltage,
a voltage of each said second set of horizontal output signals is one of a second high voltage and a second low voltage, and
an order of voltages from highest to lowest is first high voltage, second high voltage, first low voltage, and second low voltage.

19. (NEW) The method in accordance with claim 17, wherein said step (m) comprises outputting said horizontal drive signals based on
all of said first and second set of horizontal output signals in all pixel read mode, and
a subset of said first set of horizontal output signals and a subset of said second set of horizontal output signals in particular pixel read mode.

20. (NEW) The solid-state image pickup apparatus in accordance with claim 8, wherein said drive signal generating section includes a horizontal signal driver, wherein the horizontal signal driver includes:

a first plurality of horizontal line drivers configured to output a first set of horizontal output signals based on a horizontal timing signal; and
a second plurality of horizontal line drivers configured to output a second set of horizontal output signals based on an inverted horizontal timing signal,
wherein said horizontal signal driver is configured to output said horizontal drive signals based on said first and second set of horizontal output signals.

21. (NEW) The solid-state image pickup apparatus in accordance with claim 20, wherein

a voltage of each said first set of horizontal output signals is one of a first high voltage and a first low voltage,

a voltage of each said second set of horizontal output signals is one of a second high voltage and a second low voltage, and

an order of voltages from highest to lowest is first high voltage, second high voltage, first low voltage, and second low voltage.

22. (NEW) The solid-state image pickup apparatus in accordance with claim 20, wherein said horizontal signal driver is configured to output said horizontal drive signals based on

all of said first and second set of horizontal output signals in all pixel read mode, and

a subset of said first set of horizontal output signals and a subset of said second set of horizontal output signals in particular pixel read mode.